MILO, A VALUABLE GRAIN CROP

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FARMERS' BULLETIN 1147

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Plant Industry

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Washington, D. C. November, 1920

MILO is one of the important grain-sorghum crops in the southern Great Plains area. Approximately 1,205,000 acres were grown in 1918, with a value of $21,300,000.

Milo was introduced into this country soon after 1880. It has been much improved since then. Four varieties of milo—Standard milo, Dwarf milo, White milo, and Dwarf White milo—are now grown to some extent. Dwarf milo probably occupies a larger acreage than all the other varieties combined.

The milos produce better than other grain sorghums where the rainfall is low and the altitude high. Dwarf milo leads in yield in sections where the elevation ranges up to 4,000 feet and where the annual rainfall is 20 inches or less.

Further progress is possible in increasing the quality and yield of milo. The best and surest way to improve the crop is for each farmer to select his seed, prepare a good seed bed, and give the crop good, clean cultivation.

The milo crop is used for feed for all kinds of stock. The grain is used to a slight extent as food for man.

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VALUE OF MILO.

MILO has long since passed the experimental stage as a farm crop in the southwestern United States. The rapid increase in its acreage and value in the past 19 years is evidence of that fact. In 1899 approximately 25,000 acres were devoted to milo in this country, with an aggregate value of $200,000. By 1909 the crop area had increased to 307,000 acres, with a value of $2,900,000, while in 1918 the crop was estimated at 1,205,000 acres, valued at $21,300,000. Thus the acreage has increased to nearly 50 times that of 1899, while the value is more than 100 times as great. The increase in acreage in the 10 years from 1909 to 1918, inclusive, has been rapid and substantial. It amounts to a total of about 900,000 acres, with an added value of $18,400,000.

Milo has not yet reached its economic limits in either acreage or production. These should increase still further as the value and the adaptation of the crop are more generally understood. Many acres of land in the district where milo is adapted which are now unused or devoted to other less profitable crops may be used to advantage by growing milo.

HISTORY OF MILO.

Milo made its first appearance in this country soon after 1880. Its source is not definitely known. Africa probably is the home

of milo, but no sorghum since brought from there is exactly like it. One variety from Egypt, called yellow durra, is similar to milo, but it does not yield as well as milo under our conditions.

Milo was first grown in South Carolina or Georgia, and was widely advertised by an Atlanta seed firm in the spring of 1887. In some way it was introduced into western Texas, and has spread over the dry sections of that and adjoining States. Milo supplied a much-needed crop in that section of the country, because it is able to produce grain and forage under conditions where corn and other less well adapted crops fail. The acreage is steadily increasing there, but in the Southern States, under humid conditions, milo can not compete with corn. Therefore in South Carolina and Georgia, where it was first grown, its culture has practically ceased.

CHARACTERS OF MILO.

The stalks of milo are of medium size, dry, and pithy. They grow to a height of 5 to 8 feet and bear 8 to 10 rather short, narrow leaves. The heads are large, ovoid or oval, compact, and either erect or pendent. The glumes are black, hairy, and transversely wrinkled. The seeds are large, salmon (yellowish pink) or white, much flattened, and are about one-third inclosed in the hull.

When milo was first introduced it was tall, nonuniform in height, and produced many suckers and branches. A large percentage of the heads were pendent (fig. 1). These characters, which are objectionable in a grain crop, developed to a large degree whether the crop was grown under favorable or unfavorable conditions. Tall and nonuniform grain crops can not be harvested readily either by hand or with machinery. The grain from suckers and branches usually is not ripe when the crop should be harvested. Suckers may mature as early as the main stalk, but branches seldom do. Immature seed from branches and suckers lowers the grade and keeping qualities of the grain. The pendent heads catch on the machinery and delay all operations connected with harvesting and thrashing. If tied into bundles, the tops are larger than the bottoms, making the bundles difficult to shock so that the shocks will shed water.

When first introduced milo possessed some characters desirable in a grain crop. It was fairly early, drought resistant, productive, and had good seed-holding power. Some grain-sorghum varieties shatter freely when left in the field until overripe, but milo does not. By reducing or eliminating the undesirable characters and improving the desirable ones by selection, milo has been made one of the leading grain-sorghum crops.

The carefully selected milo is a great improvement over the common milo of the past. It has been reduced to a uniform height of about 5 feet when grown in the Plains region at an altitude of 3,000 to 4,000 feet above sea level. The heads have been changed from mostly pendent to mostly erect under average dry-land conditions. A very small percentage of the heads of the improved strains are pendent, i. e., declined below the horizontal line, when grown under average conditions. Many heads are slightly inclined, but for all practical purposes this is not a serious objection. Such heads may be harvested readily by hand, with a row binder, or with a grain header without difficulty. Branching has been practically eliminated, and the tendency to sucker under normal growing conditions has been much reduced. Earliness has been increased until now these strains ripen in 90 to 110 days in the Panhandle of Texas and adjacent territory. The grain yield has been increased, and the quality of the grain has been improved.

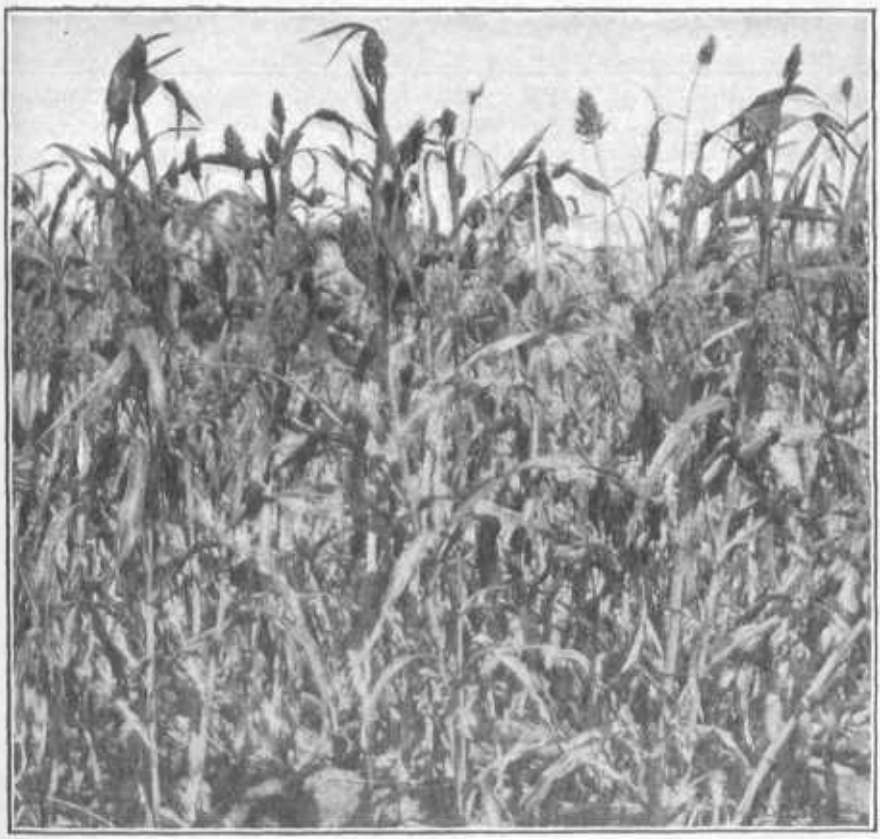

FIG. 1.—Field of ordinary unselected milo, from 6 to 7½ feet tall, with stout, branched stems and pendent heads.

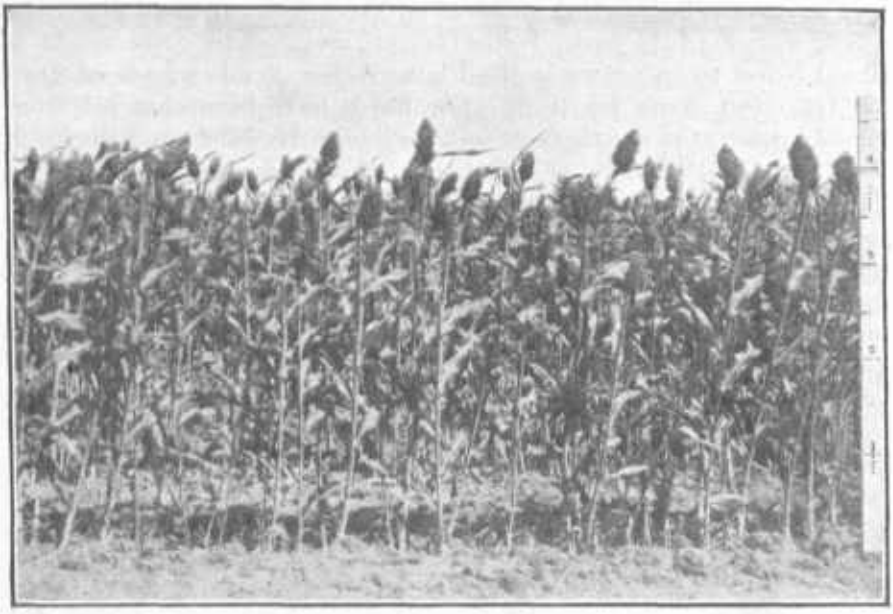

FIG. 2.—Field of milo improved by selection, from 4 to 4½ feet tall, slender, without branches, heads erect.

ADAPTATION.

Milo is well adapted to the semiarid conditions of the southern Great Plains area. It is a warm-weather plant and naturally does best in a warm, sunny climate. Milo requires less water than corn and is less susceptible to damage from hot, drying winds. It is earlier than any of the kafir varieties, which makes its growth possible in shorter seasons and at higher altitudes. Better results usually can be expected from milo than from kafir at altitudes ranging from 2,000 to 4,000 feet where the average annual rainfall ranges from 15 to 20 inches. The northern boundary of Kansas is about the northern limit for milo. Corn is a better crop than milo north of that line.

IMPORTANCE OF THE CROP.

Milo has many times demonstrated its importance in certain sections of Kansas, Oklahoma, Texas, Colorado, and New Mexico. It has proved to be the surest and most productive feed grain crop that can be grown in certain localities in these States, owing primarily to its ability to grow in comparatively short seasons and at high altitudes, characterized by hot summer days, low rainfall, and long droughty periods.

Good crops of milo are produced under an annual rainfall of 15 to 20 inches and with a seasonal (April to September) rainfall of

8 to 12 inches, when distributed to the advantage of the growing crop.

Milo has proved an important crop under irrigation in southern Arizona and California. It produces higher yields than other varieties of grain sorghum and can be sown after small grain is harvested, making possible the growing of two grain crops on the land in one year.

VARIETIES OF MILO.

There are now four well-known varieties of milo, viz, Standard milo, Dwarf milo, White milo, and Dwarf White milo. These differ mainly in the height of the plants, color of the seed, and in productiveness under semiarid conditions.

STANDARD MILO.

Standard milo is a direct descendant of the milo which was first introduced into this country. It has been much improved through selection for shorter stalks, earliness, uniformity in ripening, and more uniformly erect heads. This is the crop now grown commercially under the name Standard milo in much of the southern half of the Great Plains area. In that section it grows to a height of 5 to 6 feet and produces good yields of grain in average seasons. Plants of this variety are shown in figure 2.

DWARF MILO.

Dwarf milo is probably a mutation of Standard milo. These two varieties differ chiefly in height and productiveness under dry conditions and at high altitudes. When grown under similar conditions Dwarf milo is consistently 12 to 18 inches shorter than Standard milo (fig. 3). Dwarf milo usually outyields Standard milo on the plains of the Texas Panhandle and adjacent territory. This variety is increasing in popularity among growers and is re-

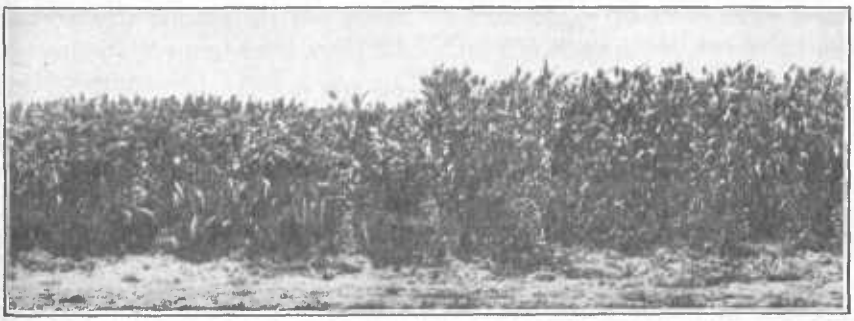

FIG. 3.—Standard milo (right) and Dwarf milo (left).

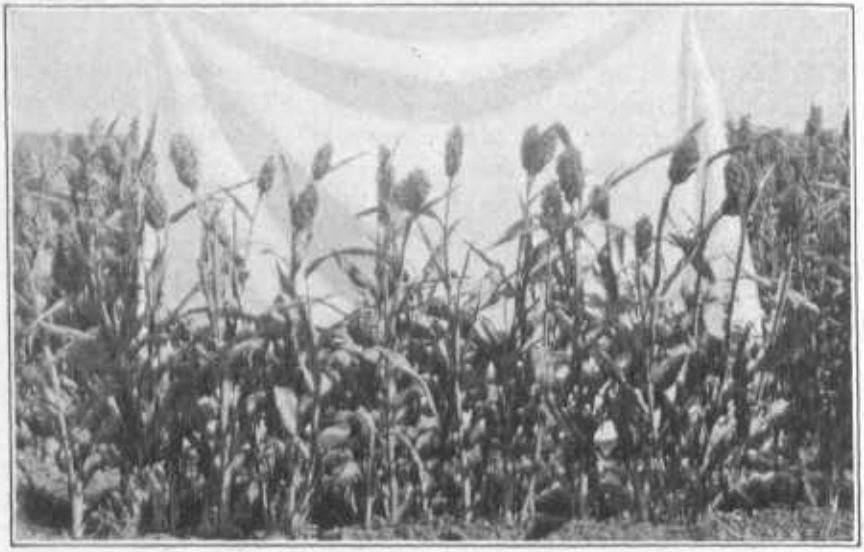

FIG. 4.—Plants of Dwarf milo.

placing the Standard variety to a large extent. Plants of this variety are shown in figure 4.

WHITE MILO.

White milo is quite like Standard milo in every respect, except in the color of the seed. The seeds of this variety are creamy white, usually shading into yellowish pink at the tip, while those of the Standard variety are yellowish pink or salmon throughout.

Little is known of the early history of White milo. It probably was introduced about 25 or 30 years ago. It has been under cultivation in scattered localities in western Texas and Oklahoma for at least 10 or 12 years. White milo has no advantage over the Standard variety and does not compete with the Dwarf variety in yield. It has no character which would cause farmers to grow it in preference to the Standard variety. Therefore, the acreage is small and not likely to increase very much.

DWARF WHITE MILO.

Dwarf White milo bears the same relation to White milo that Dwarf milo does to Standard milo. It undoubtedly is a mutation of White milo. Dwarf White milo appeared under cultivation a few years ago on the Plains of Texas and Oklahoma. It is well adapted to conditions obtaining there, and good yields have been reported in recent years.

YIELD OF MILO.

The milos had a higher average yield in the 11-year period from 1908 to 1918, inclusive, than any other group of grain-sorghum varieties at the Cereal Field Station, Amarillo, Tex. This station is located in the Texas Panhandle at an altitude of 3,600 feet and has an average annual rainfall of 21 inches. In that 11-year period the best strain of Standard milo averaged 20 bushels to the acre and the best Dwarf milo averaged 24 bushels. White milo averaged 18 bushels per acre during the nine years beginning in 1910. Feterita has an average yield of 21 bushels, and Dawn kafir, which is the best variety of the kafir group, 16 bushels in the 11-year period from 1908 to 1918, inclusive.

The foregoing figures show that Dwarf milo leads all others by a substantial margin in the Amarillo section of the Texas Panhandle. It also leads all other varieties in grain production at the Dalhart Field Station, Dalhart, Tex. This station is situated at an altitude of 3,900 feet. At the Tucumcari Field Station, Tucumcari, N. Mex., the average yield of Dwarf milo was 22 bushels and that of Dawn kafir 22.7 bushels for the 6-year period from 1913 to 1918, inclusive. The best Dwarf milo averaged 16.8 bushels and the best kafir averaged 22.7 bushels in the 5-year period from 1914 to 1918, inclusive, at the Woodward Field Station, Woodward, Okla. This station is located in the northwestern part of the State at an altitude of 1,900 feet and has an average annual rainfall of 24 inches. At the Lawton Field Station, Lawton, Okla., the kafirs are more reliable than the milos, owing primarily to the attacks of chinch bugs. This insect damages milo to a greater extent than it does the kafirs.

Data taken from the report of the Kansas State Board of Agriculture show that in the 4-year period from 1915 to 1918, inclusive, the average yield of the milos was higher than that of either kafir or feterita in 25 of the 46 counties of the State west of the ninety-eighth meridian. These 25 counties lie mostly in the southwestern portion of the State. The average yield of milo was approximately equal to that of the other grain-sorghum varieties in 12 other counties. Thus it is seen that milo is more productive than other grain sorghums in western Kansas.

HOW TO INCREASE THE YIELD.

Although marked improvement has been made in increasing the yield and quality of milo, there still is room for further advances. Much of the crop shows a mixture of many types and hybrids. The yield and quality of grain from such mixtures usually are not as

high as from pure varieties; therefore the use of mixed seed and seed from unknown sources should be avoided as far as possible.

Milo readily crosses with all other sorghums, including broom corn and Sudan grass, when grown near them. Such crosses produce inferior hybrids which are not uniform in height and ripening, and many of them produce little, if any, grain. If the bulk grain from such crops is used for sowing, the succeeding crops will produce decreased yields of inferior grain.

The best seed should be used for sowing. The surest way to obtain this is for each farmer to select and save his own milo seed. This should be done before the main crop is harvested by going through the field and selecting a number of the best heads. Uniformity should be the watchword in making seed selection. The main points to be considered in selecting seed heads are: (1) Uniformity in height of plants, (2) uniformity in earliness, (3) uniformity in size and shape of the heads, (4) productiveness, (5) drought resistance, (6) freedom from branches and suckers, and (7) erectness of heads. Ordinarily, early dwarf plants with large heads should be selected. Well-formed milo heads are shown in figure 5.

SOIL REQUIREMENTS.

In soil requirements, milo is quite like other sorghums and corn. In the sections where milo is a staple crop, moisture is the limiting factor in production rather than soil fertility. Sandy loam soils produce good crops of milo with less rainfall than heavy soils or very light ones.

PREPARING THE SEED BED.

PLOWING THE LAND.

The time to plow and the depth at which plowing should be done depend largely upon the nature of the soil, the amount of moisture it contains, and the surface covering. Conservation of moisture is the prime factor in the region where milo is grown. The man on the land is the best judge as to the time and depth of plowing which will serve this purpose best.

Growing weeds rob the soil of moisture, while dead ones and grain stubble catch the snow and help prevent it and the surface soil from blowing off the fields during high winds in winter. The relative value of fall and of spring plowing is determined by the amount of moisture each will conserve. If heavy rains come early in the fall and plowing can be done before the weeds use the moisture, fall plowing is desirable. Otherwise, nothing is gained in this respect. However, late fall or winter plowing helps to distribute farm labor to good advantage and tends to avoid a congestion of spring work.

Soil subject to blowing should be listed instead of plowed. The lister furrows largely prevent soil blowing. If listing is done in the fall, the furrows will catch the snow and prevent much of it from being blown off the field.

HARROWING.

Plowed land should be worked into a compact, even seed bed before the crop is sown. This usually can be done best with the disk and spike-tooth harrows. The work necessary to make a compact seed bed depends upon the nature and condition of the soil. A deep working with the disk usually should be given first. This will pulverize the soil to a good depth and destroy weeds. Later the land should be worked at least once with the spike-tooth harrow, which will level the surface soil to some extent and kill weeds which are just starting. More work may be necessary on some soils, but it is not desirable to work the surface into a fine dust mulch. Most soils in that condition blow readily in high winds or puddle and crust when rain comes.

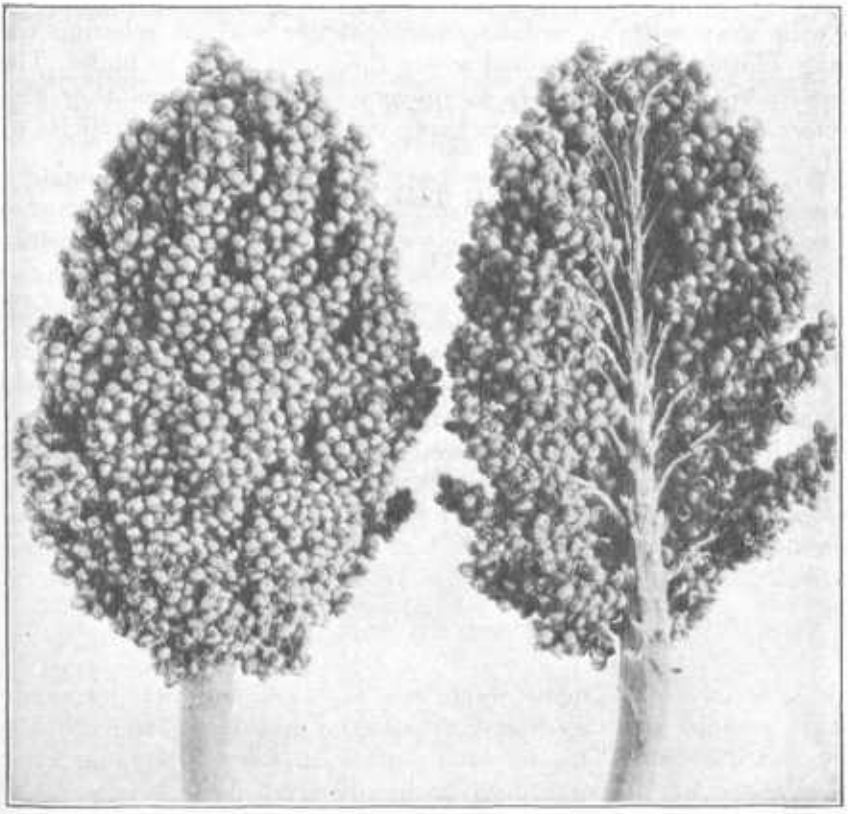

FIG. 5.—Good type of milo head, showing inside construction at right.

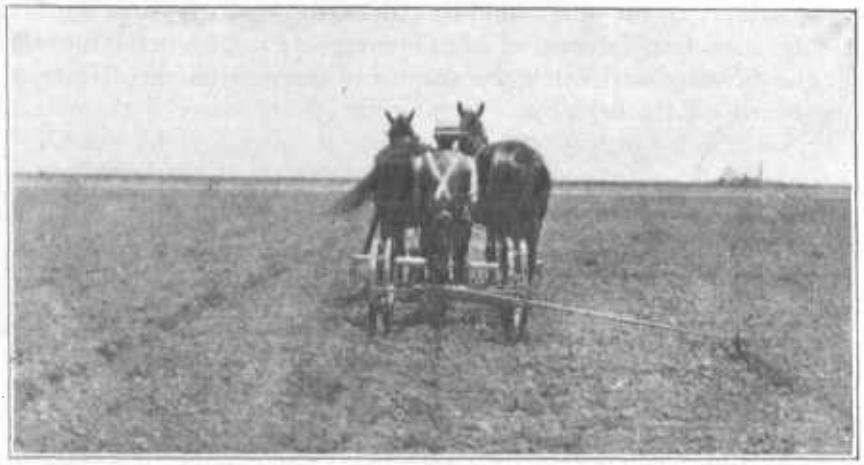

FIG. 6.—A 2-row surface drill in operation, Amarillo, Tex.

Listed land may be worked down with the disk harrow just before seeding time and then relisted when the crop is sown. The seed may be sown with an ordinary corn planter without relisting the land. However, listing is best where the soil is likely to blow. The lister furrows not only help to prevent soil blowing, but they also protect the young plants from being cut off by moving particles of soil.

SOWING THE CROP.

HOW TO SOW.

Seeding is done either with an ordinary corn planter or a lister fitted with sorghum plates. The seed should be drilled in rows about 3½ feet apart. It may be surface sown or listed. That method should be used which experience has proved best for similar crops in any given locality. Surface-sown seed usually comes up sooner than listed seed, because the surface soil warms up quicker than the bottom of the lister furrows. Figure 6 shows a 2-row planter in operation on a well-prepared seed bed at Amarillo, Tex., and figure 7 shows a 2-row lister in operation at Hays, Kans.

WHEN TO SOW.

Milo is a warm-climate plant, and the seed will not germinate readily in cold soil. Seeding should not be done until after the surface soil is warm. This is usually from 10 days to 2 weeks after the average date for planting corn in any given locality.

In the Panhandles of Texas and Oklahoma seeding should start about May 15, and it can not be delayed much later than June 15. At

lower altitudes farther east and south seeding may start earlier and continue later than the dates mentioned. Seeding must not be delayed too late, or early frost will catch the crop before it can mature. Milo requires from 90 to 110 days to mature, depending on the season.

HOW MUCH TO SOW.

Usually from 2 to 3 pounds of milo seed are required to sow an acre. In dry seasons thin stands give best results, and in wet seasons thick stands yield highest. A stand with about 10 inches of row space to the plant in rows spaced 3½ feet apart has given the highest average yield in a series of years at the Cereal Field Station at Amarillo, Tex. Like results may be expected in other localities with similar conditions.

On plump viable seed should be used. All hulls and small, cracked, and immature kernels should be screened or blown out by the use of a fanning mill. It is not possible to have the plants distributed uniformly in the row unless clean seed is used.

CULTIVATION.

Cultivation should be started early and be repeated often enough to keep the weeds down and the surface soil loose. The young plants grow slowly at first, and their growth may be further retarded or the plants entirely destroyed if weeds are allowed to grow in large numbers. Milo and weeds can not grow on the land at the same time without results unfavorable to the milo. A worthless weed may use as much moisture as a milo plant uses.

The spike-tooth harrow gives very good results for the first two cultivations of surface-sown milo. The first harrowing should be

FIG. 7.—A 2-row lister in operation, Hays, Kans.

done about the time the plants are emerging, and the second one just before the plants are large enough to be satisfactorily worked with the row cultivator. This will keep the surface soil loose, thus aiding the young plants to make a good start and destroying the weed seeds which are germinating. The harrow teeth must be set slanting back at an angle, so that they will not dig into the soil deep enough to pull out the young plants. It is best to cultivate the listed crop with the lister cultivator. While the plants are small the disks are set to turn the soil away from them; later, the disks are reversed to throw the soil to the plants. Thus the furrows are filled and the ridges leveled as cultivation continues. After the ridges have been leveled, an ordinary cultivator must be used if further cultivation is given.

HARVESTING.

There are three practical ways of harvesting milo: (1) Cutting the heads from the standing stalks by hand with a knife and throwing them into a wagon box, the same as husked corn; (2) using a corn binder which cuts the stalks off near the ground and ties them in bundles; and (3) using a grain header. The method to be used by any individual farmer depends upon the use to be made of the crop, the supply and cost of labor, and the acreage of the crop to be harvested.

In the first and third methods of harvesting, the stover is not used except for pasture. If the acreage is small, cutting the heads by hand is usually a satisfactory way of harvesting. By the use of the grain header more acres can be harvested in a shorter time, and this method should be employed where the acreage is large.

CURING.

Milo must be cured before it is thrashed or stored for the winter. This may be done in several practical ways if the heads only are harvested. They may be piled in long, narrow windrows or small piles on sod and left until cured, or they may be put into well-ventilated cribs. The latter method of curing is preferable, because the heads are protected from discoloration or other damage from damp or rainy weather. The cribs need not necessarily be built of expensive materials. They may consist simply of posts set into the ground with wire netting or fencing stretched around them to hold the heads in place. A roof which will protect the heads from rain and snow should be provided. This may be made of any material at hand which will turn water. The cribs should not be more than 6 or 7 feet wide, so that the air can circulate through them and prevent the mass of heads from molding.

When the plants are harvested and tied into bundles these are set in shocks to cure. The shock should contain not more than 12 or 15 bundles each. The air can not circulate through the shock if it is made too large, and the bundles in the center will mold. A field of milo in the shock is shown in figure 8.

THRASHING.

An ordinary grain separator is used for thrashing milo, but care must be taken to prevent the kernels from being cracked. Milo is larger and softer than wheat and will not stand as close or as hard thrashing. The close adjustment of the concaves and cylinder and the high speed of the latter, which is necessary for thrashing wheat, will crack a large percentage of the milo kernels. Therefore it is necessary to readjust the cylinder and concaves for thrashing milo. More space must be provided for the milo heads to pass through, and the speed of the cylinder must be reduced. Very satisfactory results are accomplished by removing about half of the concave teeth and then running the cylinder at about two-thirds of the speed used in thrashing wheat. This may be done by the use of a larger pulley on the cylinder shaft.

When the crop is cured in the bundle the heads should be cut from the stalks before thrashing. This is done readily by laying the bundles across a block and chopping the heads off by a single blow with a large axe, or with a long knife hinged at one end and mounted on a frame or on the wagon box. It is possible to run the whole bundles through the separator, but this method is not satisfactory if the stalks are long or heavy. The coarse, heavy butts of the stalks

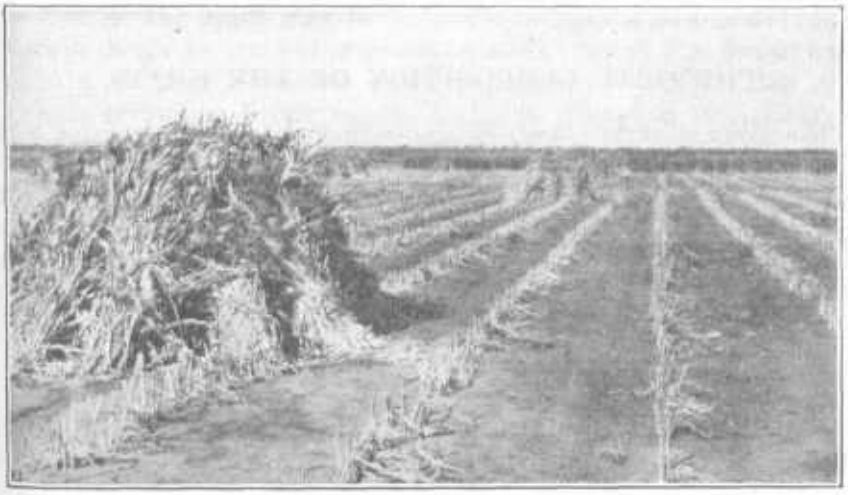

FIG. 8.—A field of milo in the shock.

clog the shakers in a short time, which makes it necessary to stop the machine so that they may be removed by hand.

STORING THE GRAIN.

Milo, like other sorghum grain or corn, will get out of condition when stored in large bulk for any considerable length of time. The drier and cleaner the grain, the longer it will keep when stored. Moisture, cracked kernels, and dirt are the principal factors which cause the grain to spoil. Of these factors, moisture probably is the most common cause of trouble. Cracked kernels absorb more moisture from the air, are more susceptible to mold, and pack closer than whole ones. Small bits of trash or dirt of any kind absorb moisture and exclude the air, which causes the grain to heat and starts fermentation.

The average moisture content of milo is not as high as that of corn. However, when the water content is above normal the grain will heat readily if not handled carefully. The grain should be dry before it is stored in bins. The cracked kernels and dirt also should be screened or blown out. The risk from damage in storage will be much smaller if these precautions are taken. The cracked grain or screenings is not necessarily a loss, as it may be used for feed before spoiling.

If stored in bulk, the grain should be watched and stirred or moved so that air can pass through to dry and cool it if heating starts. This can be done readily in grain terminals and elevators where room and necessary machinery are available, by elevating the grain from one bin to another. On farms not equipped for handling the grain in that way, the bins should be small and well ventilated or the grain should be stored in bags.

CHEMICAL COMPOSITION OF THE GRAIN.

The average of 139 analyses shows that milo grain contains 9.31 per cent of water, 1.61 per cent of ash, 1.99 per cent of nitrogen, 12.49 per cent of protein, 71.88 per cent of carbohydrates, 3.22 per cent of fat, and 1.48 per cent of fiber. These samples were grown at the Amarillo Cereal Field Station, Amarillo, Tex., in the eight years from 1908 to 1912 and 1914 to 1916, inclusive. The analyses were made by the Plant-Chemical Laboratory of the Bureau of Chemistry, United States Department of Agriculture. For comparison, the average of 86 analyses of dent corn are given: Water, 10.60 per cent; ash, 1.50 per cent; protein, 10.30 per cent; carbohydrates, 70.40 per cent; fat, 5 per cent; and fiber, 2.20 per cent. These samples of corn

were grown in different years and in different States and were analyzed in various places. They may not be directly comparable with the analyses of milo samples which were grown at one place and analyzed in one laboratory, but they are probably fairly representative of the average corn used for feeding purposes.

Milo is seen to be higher in protein content and in carbohydrates than corn. The fat content, which is the most valuable part of the grain for fattening stock, pound for pound, is lower in milo than in corn. Fat in the feeding ration has an effect similar to that of a concentrated carbohydrate, which makes corn distinctly richer in that respect than milo.

The digestibility of the starches in grain largely determines its feeding value. Experiments made in the past 18 years with cattle and hogs to determine the digestibility of sorghum grain agree in general that the starch of the sorghum grains is less digestible than that of corn. The difference averages about 10 per cent, which gives the sorghum grain about 90 per cent of the feeding value of corn.

USES OF THE CROP.

The milo crop is used for feeding all kinds of stock. It may be used either as a grain ration or a roughage ration for horses and cattle. The use of the crop for silage is increasing. The grain is also used as food for man.

FEED FOR STOCK.

Milo is fed to horses, cattle, sheep, hogs, and poultry much the same as corn is fed. Milo may be fed in the bundle as a roughage ration or the heads may be fed separately as a grain ration. The grain should be cracked or ground coarsely before it is fed to horses, cattle, or hogs. Cracked grain digests more readily than whole grain and gives better results, as grain grown in dry climates is usually very hard and is not readily crushed by live stock. Therefore much of it may pass through the animals whole if it is not cracked before feeding. The whole heads may be ground without first thrashing, or the grain alone may be cracked. The former is known commercially as head chops and the latter as milo chops. Milo is used quite extensively in combination with other grains in the manufacture of poultry or chick feeds.

Milo does not form a balanced ration. For best results it should be supplemented with other feeds rich in protein, such as alfalfa, clover, or other leguminous hay, or cottonseed meal or cake.

FOOD FOR MAN.

For many years milo has been used to a limited extent for human food. In recent years scientific experiments have been conducted to determine the value of milo in the human diet. The results of these experiments show that milo meal is about equal to corn meal. It can be used alone for batter cakes and muffins or it can be mixed with wheat flour in varying proportions in the same way that corn meal is used for making loaf bread.

DISEASES AND INSECT ENEMIES.

DISEASES.

Milo differs from most other varieties of sorghum in that so far as known it is immune to kernel smut. This is an important characteristic, because there is no loss to the crop from that source. Kernel smut is quite common among susceptible sorghum varieties and causes heavy losses if not kept under control. No disease seriously affects milo.

INSECT ENEMIES.[1]

The insect enemies of milo are few and seldom cause serious trouble. In some localities and under certain conditions chinch bugs do considerable damage to the young plants. Aphids or plant lice sometimes accumulate in great numbers on the leaves and soft portions of the young plants of milo, as they do on all other sorghums, and tend to stunt them by sucking the juices. The fall army worm may cause damage to the plants by tunneling through the tightly coiled leaves, causing a series of round holes which show when the leaves unfold, or they may tunnel in the stem, particularly near the heads. This weakens the leaves and stem and high winds break them off. The sorghum midge causes sterility at low altitudes and especially under humid conditions, as in all other sorghums, by laying its eggs in the flowers. The larvæ prevent seed production by absorbing the juices from the young ovary, so that the kernel never develops. Damage by the midge in the San Antonio district of Texas and under similar conditions largely may be prevented by the early seeding of early varieties, as the crop then comes into flower before the midge appears in large numbers. It is possible that this freedom from injury may be due to parasites which hold the midge in check in the early part of the season.

[1] This account of the insect enemies of milo has been approved by the Bureau of Entomology.

PUBLICATIONS ON GRAIN SORGHUMS.

In the list that follows, those publications to which no price is attached may be obtained without charge upon application to the Secretary of Agriculture; publications having a price attached may be obtained only by remitting the sum stated to the Superintendent of Documents, Government Printing Office, Washington, D. C.

FARMERS'. BULLETINS.

Better Grain-Sorghum Crops. (Farmers' Bulletin 448.) Price, 5 cents.
Kafir as a Grain Crop. (Farmers' Bulletin 552.)
Use of Corn, Kafir, and Cowpeas in the Home. (Farmers' Bulletin 559.)
The Feeding of Grain Sorghums to Live Stock. (Farmers' Bulletin 724.)
Cereal Crops in the Panhandle of Texas. (Farmers' Bulletin 738.)
Shallu, or "Egyptian Wheat." (Farmers' Bulletin 827.)
Growing Grain Sorghums in the San Antonio District of Texas. (Farmers' Bulletin 965.)
How to Use Sorghum Grain. (Farmers' Bulletin 972.)

DEPARTMENT BULLETINS.

Corn, Milo, and Kafir in the Southern Great Plains Area: Relation of Cultural Methods to Production. (Department Bulletin 242.)
Crop Production in the Great Plains Area. (Department Bulletin 268.)
Studies on the Digestibility of the Grain Sorghums. (Department Bulletin 470.)
Grain-Sorghum Experiments in the Panhandle of Texas. (Department Bulletin 698.)

BUREAU OF PLANT INDUSTRY CIRCULARS.

Feterita, a New Variety of Sorghum. (Bureau of Plant Industry Circular 122–C.) Price 5 cents.
Three Much-Misrepresented Sorghums. (Bureau of Plant Industry Circular 50.) Price, 5 cents.

BUREAU OF PLANT INDUSTRY BULLETINS.

The History and Distribution of Sorghum. (Bureau of Plant Industry Bulletin 175.) Price, 10 cents.
The Importance and Improvement of the Grain Sorghums. (Bureau of Plant Industry Bulletin 203.) Price, 10 cents.
Grain-Sorghum Production in the San Antonio Region of Texas. (Bureau of Plant Industry Bulletin 237.) Price, 5 cents.
The Kaoliangs: A New Group of Grain Sorghums. (Bureau of Plant Industry Bulletin 253.) Price, 15 cents.

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